

STATE

OF

TENNESSEE

(Rev. 02-22-08)  
(Rev. 11-10-08)  
(Rev. 12-15-09)  
(Rev. 12-28-10)  
(Rev. 09-27-11)  
(Rev. 1-7-2015)

January 1, 2015

SPECIAL PROVISION

REGARDING

BITUMINOUS PLANT MIX PAVEMENTS (HOT MIX)

ROADWAY DENSITY

**Description:** This specification covers the requirements for acceptance of asphalt roadway density by use of core samples. This provision also includes language for testing and acceptance of asphalt longitudinal joint density.

All sections of Section 407 of the Standard Specification, and Supplemental Specifications are applicable except as modified herein.

**Section 407.03(D)2.h.- Contractor Quality Control System- Add the following between the second and third paragraphs:**

The Contractor will be required to conduct quality control testing of surface and binder mixes for roadway density throughout placement to verify that the mixture being placed meets specified density requirements. A Quality Control Plan (QCP) for this density testing is required. Acceptable methods of quality control testing include coring, nuclear gauge testing, and non-nuclear gauge testing.

**Section 407.07- Rollers. Replace the entire section with the following:**

The Contractor shall use a sufficient number and type of rollers to obtain proper compaction and obtain the specified densities.

**Section 407.15- Compaction. – Replace the entire section with the following:**

**A. General**

After the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly compacted. The method employed must be determined by the contractor and be capable of compacting the mixture to the specified density while it is in a workable condition. Rollers shall not park on the bituminous pavement nor shall rollers be refueled on the bituminous pavements.

**B. Density Requirements**

- Mix Types: A, B, BM, BM-2, D, E
- All levels of ADT
- %Gmm values specified here are for lot averages.

<b>Travel Lane Density</b>		
% Gmm		% Pay
Min	Max	
99.1	100	90
98.1	99	94
97.1	98	98
96.1	97	100
95.1	96	101
94.1	95	102
93.1	94	101
92.1	93	100
91.1	92	98
90.1	91	94
89.1	90	90
88.1	89	86
87.1	88	*
86.1	87	*
85.1	86	*
<85	85	*

**Table 407DEN-1**

<b>Joint Density Incentive/Disincentive</b>		
%Gmm		\$/L.F./Lot
Min	Max	
99.1	100	*
98.1	99	*
97.1	98	-0.70
96.1	97	-0.42
95.1	96	0.00
94.1	95	0.00
93.1	94	0.07
92.1	93	0.14
91.1	92	0.07
90.1	91	0.00
89.1	90	-0.14
88.1	89	-0.42
87.1	88	-0.70
86.1	87	-0.98
85.1	86	*
<85	85	*

**Table 407DEN-2**

\*Shall be removed and replaced at the contractors expense or as directed by the engineer.

Payment shall be for travel lanes only, even when the shoulder and travel lane are placed concurrently. No incentive shall be paid for the second travel lane mat unless the joint for that lot is a minimum of 90.1%.

Any lot of joint density tests averaging below 87% shall be sealed at the Contractor’s expense. Approved sealers are listed on the TDOT Qualified Products List (QPL), Listing #40 for Pavement Sealers. Sealing of deficient longitudinal joint lots will only be required for surface mixes.

- Mix Types: All shoulder mixes
- All levels of ADT
- %Gmm values specified here are for lot averages.

<b>Shoulder Density</b>		
% Gmm		% Pay
Min	Max	
99.1	100	*
98.1	99	*
97.1	98	96
96.1	97	98
<b>95.1</b>	<b>96</b>	<b>100</b>
<b>94.1</b>	<b>95</b>	<b>100</b>
<b>93.1</b>	<b>94</b>	<b>100</b>
<b>92.1</b>	<b>93</b>	<b>100</b>
<b>91.1</b>	<b>92</b>	<b>100</b>
<b>90.1</b>	<b>91</b>	<b>100</b>
<b>89.1</b>	<b>90</b>	<b>100</b>
<b>88.1</b>	<b>89</b>	<b>100</b>
87.1	88	98
86.1	87	94
85.1	86	90
<85	85	*

**Table 407DEN-3**

\*Unacceptable or as directed by the engineer.

% Pay for shoulders shall be applied to the quantity of mix on the shoulder even when the travel lane and shoulder are place concurrently.

The density (bulk specific gravity) determination for a compacted asphalt mixture shall be performed in accordance with AASHTO T-166, Method A only. All core samples shall be COMPLETELY DRY before testing. Air drying is permitted provided core samples are weighed at 2-hour intervals until dry in accordance with AASHTO T166, Section 6.1. Cores may also be dried in accordance with ASTM D 7227.

**Section 407.20.B.5 - Acceptance of the Mixture –Replace the entire subsection with the following:**

It is intended that acceptance density testing will be accomplished as soon as is practicable.

After obtaining the cores, all core holes shall be properly filled and compacted in kind with hot mix asphalt. There will be no additional compensation to comply with this section.

Cores shall be clearly labeled in a discrete, sequential manner (i.e. – M1, M2,....,M30; J1, J2,....,J15) throughout the course of the project. After testing, cores shall be retained along with copies of test results and will be periodically obtained by the regional materials office for spot-check verification testing.

**Mat Density (Travel Lanes and Shoulders)-** For density acceptance purposes, the pavement shall be divided into lots of 15,000 linear feet and sublots of 3,000 linear feet, or fraction thereof, per paving width per mixture type. Control strips shall not be included as part of acceptance lots. At the beginning of the project, the first lot will begin immediately after the end of the control strip. When possible, attention should be provided to avoid cutting cores in areas where signal/loop wire may be affected. If test location selections indicate testing locations in these areas, a new random number should be selected.

Five randomly selected cores (4" min./ 6" max. diameter), from the travel lane, will be tested to determine density compliance and acceptance. One core shall be taken from each subplot. The Bulk Specific Gravity ( $G_{mb}$ ) of the cores shall be determined as stated above and the average calculated. The maximum theoretical gravity ( $G_{mm}$ ) from acceptance testing for that shift's production will be averaged and the percent density will be determined for compliance by dividing the  $G_{mb}$  average by the  $G_{mm}$  average. The Contractor will be responsible for obtaining the cores at the locations randomly selected by TDOT. Cores shall be tested by TDOT, by a certified plant technician.

Turn lane and ramp density cores shall be determined as described above when the total turn lane or ramp length is 15,000 linear feet or greater. When the total turn lane or ramp length is less than 15,000 linear feet, one density core shall be taken for each 3,000 linear feet. An average density shall be determined from the total number of cores taken from the turn lane or ramp.

**Longitudinal Joints** - Longitudinal density cores shall be taken as described above for Travel Lanes and Shoulders with the exception that the maximum theoretical gravity ( $G_{mm}$ ) from acceptance testing for both travel lanes will be averaged.

**Section 407.20, Basis of Payment, Revise section B.5. as follows:**

5. Acceptance for Mix Density on the Roadway:

**Mat Density** -A deduction in payment, not as a penalty but as liquidated damages, shall be made for failure to meet the density requirements as outlined within this provision in Subsection 407.15.B. As soon as practical after the final rolling is completed on each lot, 5 density tests (1 per subplot) shall be performed by the Department at locations determined by the Engineer, and an average of all such tests shall be computed. Test locations shall be as defined above in revisions to Subsection 407.20.B.5. Any deduction for failure to meet density requirements or incentive for exceeding density requirements shall be computed to the nearest 0.1% as a percentage of the total payment otherwise due for each lot.

The percent of total payment shall be in accordance with tables shown in Subsection 407.15.B., "Density Requirements" above. Any deduction in monies due the Contractor for failure to meet the Density Requirements shall be made under the item for Density Deduction.

**Longitudinal Joints** – The total incentive/disincentive payment shall be in accordance with tables shown in Subsection 407.15.B., "Density Requirements" above. Any deduction in monies due the Contractor for failure to meet the Density Requirements shall be made under the item for Density Deduction. Any incentive payment due the contractor shall be under item Density Incentive.